1. DESIGN & METHODOLOGY

A research design is a framework or blueprint for conducting the research project. It specifies the details of the procedures necessary for obtaining the information needed to structure and/or solve the research problems. It lays the foundation for conducting the project (Malhotra, Naresh K., 2010). The research methodology, which is a part of the overall research design, articulates the choice of research methods/techniques thereby providing a scientific approach to answer the research questions and test the research hypotheses. A good research design and methodology will ensure that the research project is conducted effectively and efficiently.

This chapter deals with the design and methodology adopted for this study and is divided into five sections. These sections detail out the design and methodology for each of the phases of the research project outlined in Figure 4.1 respectively. These phases are (1) conceptual development; (2) development of measures and scale; (3) data collection; (4) data preparation and analysis; and (5) hypotheses testing. The phases identified for this research is appropriate for the conclusive nature of this study which is aimed at testing specific hypotheses and examining relationships amongst the identified dimensions and their constructs. Conclusive research (more formal and structured than exploratory research), typically, is based on large, representative samples, and the data obtained are subjected to quantitative analysis. This study uses a descriptive research design employing the survey method for data collection and quantitative techniques for validation of measures and hypotheses testing. The detailed processes followed in each of the research phases are described in subsequent sections of this chapter. The actual analysis and results are presented in the next chapter.
Phase 1: Conceptual Development
- Literature Review to identify Dimensions and Constructs
- Focus group meetings and Interactions for conceptual refinement

Phase 2: Development of Measures and Scale
- Literature Review for Item identification
- Focus group meetings and Interactions for Item refinement
- Scale identification and refinement
- Development of Survey Instrument - Questionnaire
- Pilot testing and Questionnaire refinement & finalization

Phase 3: Data Collection
- Sample design and identification
- Fieldwork for questionnaire responses

Phase 4: Data Preparation & Analysis
- Screening, Cleaning, and Statistical modification
- Descriptive Statistics
- Tests for Reliability and Validity of Measures

Phase 5: Hypotheses Testing
- Hypotheses tests for Direct Effects
- Hypotheses tests for Mediation Effects

Figure 4.1: Overview of Research Design and Methodology
4.1 Conceptual Development

The conceptual development phase of the research required an extensive review of literature and interactions with senior IS executives, practitioners, consultants, system integrators and academicians. There were two main activities associated with this phase of research.

4.1.1 Literature review to identify initial framework

First, a thorough review of the literature related to enterprise applications, IS in public sector and government, and RBV theory was undertaken. From this review, initial frameworks were developed and dimensions were identified to describe the research model.

4.1.2 Focus group meetings and interactions

Second, a couple of focus group meetings were organized with five individuals consisting of practitioners, consultants and academicians in the domain over two different sessions – the first discussing the objective, relevance and feasibility of research and the second, discussing the initial framework and research model derived from the literature review. Specifically, the focus group consisted of an individual each from a government consulting firm, an SI, an OEM, and two management & IS/IT academic/scholars from a management institute. Worksheets were prepared and utilized to facilitate the discussions as well as record the observations during the discussions. Separate individual interactions were also carried out with other individuals and experts to obtain their feedback on the research framework and related dimensions.

After an additional examination of literature, the framework was modified to include a few additional constructs on the enterprise applications dimension. The result of this phase was a
framework for conceptualizing the entire study along with their respective dimensions for subsequent development of the item/measures and scale.

4.2 Development of Measures and Scale

Once the framework and initial dimensions were compiled and refined, the research shifted to Phase Two. In this phase, the measures/items of each of the dimensions and their scale of measurement were developed. The methodology followed in creating measures was consistent with recommendations of Churchill (1979). The major activities associated with this phase included: (1) Identification of the items for the research constructs; (2) Refinement of items; (3) Scale identification and refinement; (4) Development of the survey instrument; and (5) Pilot test for instrument refinement. Each of these activities is discussed in the sub-sections below.

4.2.1 Item Identification

As was discussed in both Chapter Two and Chapter Three earlier, an extensive review of the literature was undertaken to identify the important items for measuring the various constructs under the EA, RBV and PV dimensions respectively. Three different bodies of literature were relevant to this research: enterprise applications; RBV theory; and performance of public sector and government leading to public value measurement. The dimensions and constructs were developed in phase one. The literature was further examined in phase two to identify specific items that were key to define the finalized constructs from phase one.
4.22 Item Refinement and Finalization

The focus groups described above were also utilized to refine the items. The participants were asked to examine and comment on the appropriateness of the items for operationalizing the constructs of this research. They were also asked to suggest alterations or additions to the items that may improve the operationalization. Different areas of literature were again examined to generate the final pool of items which were then subjected to review by experts over individual interactions. An initial pool of 50 items was considered which were rationalized to a final list of 33 items after iterative literature review and expert interactions. A sorting exercise was also conducted with the initial pool following the suggestions of Moore and Benbasat (1991) to obtain initial level of validation. The whole exercise resulted in a reasonable level of content/face validity of the items to measure the desired constructs for the purposes of this research. These 33 items constituted the final research variables for the questionnaire and are shown in Appendix 1. Subsequently, a structured approach of exploratory factor analysis (EFA) was used to ensure construct validity of the items finally used in the survey instrument. This is described later in Section 4 of this chapter.

4.2.3 Scale identification and refinement

The importance of scale development need not be overemphasized for any research. In addition to theoretical considerations and evaluation of reliability and validity, certain practical factors should be considered in selecting scaling techniques for a particular research problem (Timothy R. Hinkin, 1995). These include the level of information (nominal, ordinal, interval, or ratio) desired, the capabilities of the respondent, method of administration, the context, and cost. The steps followed in the identification and refinement of the scale for this study was: (1) Choice of
the primary scale of measurement; (2) Choice of scaling technique; and (3) Scale evaluation for
its reliability and validity

4.2.3.1 Primary scale of measurement

There are four primary scales of measurement: nominal, ordinal, interval and ratio (Malhotra,
Nareh K., 2010). Interval scale (a metric scale) was chosen for the purposes of this study as all
dimensions required ratings from the respondents on the items in the survey instrument.
Additionally, interval scale permits most of the statistical techniques to be applied to the data so
collected. This was important to ensure that the scale chosen allows the quantitative nature of
analysis envisaged for this research. For the constructs of EA dimension, it was also necessary to
have an absolute zero point, hence the ratio scale was used which is an advanced form of interval
scale.

4.2.3.2 Scaling technique

It was desired that the respondents provide their ratings on a scale of specified categories against
every item in the survey instrument. The itemized rating scale was, therefore, chosen. This is a
measurement scale having numbers and/or brief descriptions associated with each category. The
categories are ordered in terms of scale position. Named after its developer, Rensis Likert, the
Likert scale is a widely used rating scale that requires the respondents to indicate the degree of
agreement or disagreement with each of a series of items about the phenomenon (dimension).
Likert scale was chosen for the purposes of this study with the following characteristics:

- Number of categories chosen were seven as the respondents were expected to be very
knowledgeable and involved with the task and hence larger number of categories (than 5)
was appropriate to obtain more refined results
A balanced categorization was provided to obtain objective data since it was not expected ab-initio that the distribution of responses would be skewed.

The scale provided odd number of categories with the middle position signifying a neutral response – the Likert scale is a balanced rating scale with an odd number of categories and a neutral point (G. J. Spagna, 1984).

A forced rating scale is used as there was no relevance of a “no opinion” choice in the items.

The verbal description is kept absolutely crisp and minimum to avoid differences in interpretation of the categories on the scale.

The physical form is also kept very simple for ease of understanding, marking and tabulation of the observations.

The scale of measurement for the various items in the survey instrument was critical to the operationalization of the various constructs under EA, RC and PV dimensions. For adoption of EA the study considers only those organizations which have “used” EA for 2 years or more. Hence, the scale needed to measure the level of assimilation/use of EA functions in the organization as perceived by the respondents. A ratio scale (an enhancement of interval scale) with an absolute zero point was used to measure the perceived percentage level of “usage” of EA. The perceived percentage level of usage of a specific EA (ERP, SRM, CRM, etc.) in the organization for their respective enterprise function was converted to a “0” or “1-7” Likert scale to standardize the measurement of constructs under EA with reference to the other constructs for this study. Measurement of items under RC and PV uses a standard interval scale “1-7” (low to high bipolar semantic differential levels) wherein the respondents provided their response to the observed increase/improvement/enhancement of a specific item in the organization. For example,
they indicated the observed level of “increase in number of people/staff” on a scale of low to high based on the observed change in their organization due to adoption of various types of EA.

4.3.3 Scale Evaluation

As discussed earlier in this Section, extensive literature survey, focus groups and expert interactions shaped the measurement items and scales. The content/face validity was achieved through this process. Additional considerations for the choice of scale and its numerous characteristics have already been described above. Subsequent analysis of the responses was also done to assess the reliability and validity of the survey instrument and, hence, the measurement scales.

4.2.4 Survey Instrument

After the finalization of the items and scales using the iterative process described earlier, the items were organized into an initial draft of a structured questionnaire which was purported to be the survey instrument for this research. Several decisions were made related to the design of the questionnaire. The sequence, layout, instructions, vocabulary, section-wise presentation and additional information to be collected were some of the key issues on which time was spent before finalizing the questionnaire for pretesting/pilot.

4.2.5 Pilot test and final questionnaire

The draft questionnaire from step 4.2.4 was subjected to pretesting/pilot with 3 executives. This was done with the purpose of improving the questionnaire by identifying and eliminating potential problems. These executives were asked to independently complete the entire questionnaire and were asked to comment on the appropriateness of items, scale, format, and
The draft questionnaire was suitably modified to reflect the suggestions of each respondent. A final document was then created along with a cover letter that was used for collecting data using the survey method for the purposes of this research. The final questionnaire that was used for this research is provided in Appendix 2.

4.3 Data Collection

This section deals with two important elements of research design: (1) Sampling; and (2) Fieldwork for obtaining the responses to the pretested and final questionnaire.

4.3.1 Sampling Design

A good sampling design involves several basic questions: (1) Should a sample be taken? (2) If so, what process should be followed? (3) What kind of sample should be taken? (4) How large should it be? (5) What can be done to control and adjust for nonresponse errors? (Malhotra, Arsh K., 2010). These questions are answered by describing the main elements of sampling design.

The target population for this research was a combination of: (1) public sector and government organizations; (2) having implemented one or more enterprise applications (EA); and (3) which have been live with EA for at least previous 2 years from the time of finalization of the list (Hitt, Wu et al., 2002). The initial list for the target population was based on compilations from various sources: Department of Public Enterprises (DPE) list; listed PSUs; and Government of India (GoI) directory. This list included 145 Central PSUs, 144 State PSUs, 35 JVs, 10 related agencies, approximately 60 Ministries and Departments, and about 30 IT departments of different States/UTs. With respect to States/UTs, the IT departments were considered as the nodal agencies for all the other line departments in the State/UT which were then added on the
recommendation of the IT department if there were agencies/departments that qualified the criteria for target population. Accordingly, some municipalities and other departments (industry, transport, etc.) from States/UTs were covered. This initial list had approximately 430 entries in total. This list was used as a checklist for identifying the potential organizations in the target population. The initial list was checked against the criteria of EA implementation and being live for at least previous 2 years by seeking information from the major EA solution providers and system integrators. Lists of such implementations were also obtained from the major product vendors viz., SAP, Oracle, Microsoft and IFS as well as from other published sources. The list of public sector and government customers of the OEMs were collated on the basis of their system generated list of “installed base report” that were obtained from the respective OEMs. Additional names of public sector and government organizations that had implemented EA were also identified and checked for the criteria of being live for at least previous 2 years. The final list for the target population was thus prepared with approximately 175 entries. This consisted of approximately 50 central PSUs, 35 State PSUs and 90 central and state government ministries/department/agencies. This approach to the preparation of the target population list had to be adopted since there is no such authentic comprehensive and consolidated list that exists.

All of these organizations in the target population were reached out to for getting the responses to the survey questionnaire. This approach to sampling can be termed as census as all the organizations in the population were considered for the survey. This is also termed as direct element sampling.

The sampling method used was random sampling (under probability sampling technique) as the fieldwork considered all the 175 organizations in the target population with equal chance for obtaining responses to the questionnaire.
The sampling unit was the individual respondent and the sampling elements were the two key informants from each of the organizations – the IT Head and the Business Head.

4.3.2 Fieldwork

Initial requests for participation in the survey were made either through telephone or email depending on data available for each of these 175 organizations. Typically, identifying the right contact person for the survey was difficult but they were obtained in most cases over a period of time. Follow-up calls and reminders were periodically made requesting the key informants to complete the questionnaire. The responses that were finally obtained were either returned through email or were taken personally after either a physical interview or a telephonic interview. Finally, a total of 126 responses were obtained of which 110 were found usable from completeness and selection criteria point of view for further analysis and hypothesis testing. This yielded a response rate of over 30% which is much above the widely acceptable response of 10% in IS research (Miles and Huberman, 1984).

The final sample size of 110 responses from 55 organizations is justified for this study on the merit of over 30% response rate; small population of 175 organizations leading to a census sample; and respondents being the most senior executives in their respective organizations. Additionally, it is well above the minimum sample size to facilitate effective multiple regression (Hair et al., 2006) which is the main statistical technique used for hypothesis testing in this research.

4.4 Data Preparation and Analysis

Upon completion of fieldwork the data collected needs to undergo a set of activities before they can be used for analysis and hypothesis testing. In fact, the use of multivariate techniques places
increased burden on the researcher to understand, evaluate, and interpret complex results. This complexity requires a thorough understanding of the basic characteristics of the underlying data and relationships (Hair et al., 2006). Without proper data preparation activities it is quite easy, for example, for several unidentified outliers to skew the results, for missing data to introduce a bias in the correlations between variables, or for non-normal variables to invalidate the results. This section describes the steps involved in data preparation, examination, transformation, descriptive statistics and test of reliability and validity. It may be noted that SPSS statistical package was used extensively for data preparation, analysis as well as hypothesis testing.

4.4.1 Initial screening and statistical modifications

The data was initially screened to identify responses that should be dropped from the analysis. Several aspects of each response were examined to determine if it should be dropped from the analysis. First, each response was scanned for completeness. Incomplete responses (more than 10%) were dropped from the analysis. Second, each response was examined for consistency with secondary information related to the same constructs. Third, the responses were screened to determine if there were significant differences between respondents and non-respondents. This was done by checking for significant differences in responses between early and late responders. Finally, the sample was screened for outliers that may inappropriately bias the results. All eight responses that were dropped from the analysis were done so due to incomplete responses.

At a later stage, after the reliability and validity analysis of the data, and before the regression analysis for hypothesis testing, the data was checked for Normality and suitably transformed if significant skewness or kurtosis was identified. This is described later in Chapter 5 which deals with analysis and results of this research.
4.2 Descriptive Statistics

Simultaneously, it was also important to summarize the data on different parameters and extract meaningful descriptive statistics to gain some useful insights about the nature of data collected. They include the name of enterprise applications, period of usage, job titles of the respondents, organization type, and business type. They are summarized later in chapter 5.

4.3 Reliability and Validity of Measures

In any research it is critical to determine the reliability and validity of measures used for the study. Reliability is the extent to which a variable or a set of variables is consistent in what it is intended to measure. If multiple measurements are taken, the reliable measures will all be consistent in their values. Validity is the extent to which a measure or set of measures correctly represents the concept of study – the degree to which it is free from any systematic or non-random error. Validity is concerned with how well the concept is defined by the measure(s), whereas reliability relates to consistency of measure(s) (Hair et al., 2006).

In this research, the steps followed to ensure reliability and validity of measures included:

1. Face/Content validity achieved through the process of literature review, expert interactions and sorting exercise which was explained earlier in section 2 of this chapter;
2. Initial reliability for all variables of the 3 dimensions of study viz., EA, RC and PV using the diagnostic measure for reliability coefficient with Cronbach’s alpha - the most widely used measure (Cronbach, L. J., 1951; Nunnally, J. L., 1978; Peter, J. P., 1979);
3. Construct validity of the measures using exploratory factor analysis (EFA) and thereby also identifying the appropriate variables for subsequent application to regression analysis for hypothesis testing; and
4. Reliability analysis of the factors/components extracted and finalized for the study from step 3 above using Cronbach’s alpha in order to ensure that the measures finally used in hypothesis testing are reliable.

In the context of Reliability of the measures it may be noted that the generally agreed upon lower limit for Cronbach’s alpha of 0.70 was considered, although it may decrease to 0.60 in exploratory research (Robinson, J. P. et al., 1991).

As stated earlier, exploratory factor analysis (EFA) was carried out for assessing construct validity and thereby identifying the final constructs to utilize for hypothesis testing using regression analysis. The general purpose of factor analysis is to find a way to summarize the information contained in a number of original variables into a smaller set of new, composite dimensions or variates (factors/components) with a minimum loss of information – that is, to search for and define the fundamental constructs or dimensions assumed to underlie the original variables (Gorsuch, R. L., 1983; Rummel, R. J., 1970). The EFA for this research was designed with the following attributes:

- **Principal Component Analysis** was used as the factor extraction method - this considers the total variance and derives factors that contain small proportions of unique variance and, in some instances, error variance. The first few factors (which are finally chosen), however, do not contain enough unique or error variance to distort the overall factor structure. This method was used as the objective was to summarize most of the original information (variance) in a minimum number of factors for prediction (regression) purposes.
Orthogonal rotational method, Varimax, was used – they are the most widely used rotational method and are the preferred method when the research goal is data reduction to either a smaller number of variables or a set of uncorrelated measures for subsequent use in other multivariate techniques, such as regression used for hypothesis testing in this research (Hair et al., 2006).

The *number of factors/components* selected for this study was primarily based on stopping criteria considering the factors having latent roots or eigenvalues greater than 1 (all factors with latent roots less than 1 are considered insignificant and are disregarded). The rationale for this criterion is that any individual factor should account for the variance of at least a single variable if it is to be retained for interpretation. Additionally, enough factors were considered to meet the criteria of percentage variance explained of 60% or higher. Scree plots were also examined to validate the number of factors selected. As a general rule, the scree test results in at least one and sometimes two or three more factors being considered for inclusion than does the latent root (eigenvalue) criterion (Cattell, R. B., 1996).

Factor interpretation involved ensuring elimination of items with high cross-loading and identifying all variables with communalities less than 0.50 as not having sufficient explanation. Accordingly, model re-specification was done to perform the next iteration of factor analysis. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy of 0.5 and above was considered to ensure the appropriateness of factor analysis. Similarly, Bartlett's test of sphericity was used to test for statistical probability that the correlation matrix had significant correlations among at least some of the variables computed and was indicated by a significance level of less than 0.05 (Hair et al., 2006). Finally, when
an acceptable factor solution was obtained in which all variables had a significant loading on a factor/component, a conceptually acceptable label was assigned to the finally selected factors. The results and labeling, in fact, mirrored the literature as well as practice and market reality very closely and were found to be highly acceptable for further usage in hypothesis testing.

- Finally, summated scales for the factors were created using the loadings of the underlying variables as the weights of those variables in the weighted average scale of the chosen factors across each of the three dimensions – EA, RC and PV. Therefore, the scores for each factor/component were derived from the weighted average of the items that demonstrated adequate levels of validity and reliability as measures of that respective factor/component. These factor scores were utilized in all subsequent data analysis.

The final analysis and results of (1) reliability using Cronbach’s Alpha; (2) construct validity using EFA; and (3) Identified factors for hypotheses testing; are provided in Chapter 5. In all cases, sufficient content/face validity, construct validity, and internal consistency reliability was demonstrated in line with the research design principles outlined in this chapter.

4.5 Hypothesis Testing

The final phase of research design involved the testing of hypotheses. As mentioned in Chapter 3, there are two classes of hypotheses examined in this research: (1) the direct effects of enterprise applications (EA) and resource capability (RC) on performance measured by public value (PV), and enterprise applications (EA) on resource capability (RC) itself; and (2) the mediating effects of resource capability (RC) on the relationship between enterprise applications (EA) and performance measured by public value (PV).
All hypotheses are empirically examined for their inter-se relationships using multiple regression analysis. Multiple regression analysis is a statistical technique that can be used to analyze the relationship between a single dependent (criterion) variable and several independent (predictor) variables (Hair et al., 2006). In addition to assessing the importance of each variable, multiple regression also affords the researcher a means of assessing the nature of relationships between the independent variables and the dependent variable. In the current study, several multiple regressions are performed by selecting the appropriate variables as dependent and independent at a time, based on the hypothesis being tested. Multiple regression analysis requires the assumptions of (1) linearity of the phenomenon; (2) constant variance of the error terms; (3) independence of the error terms; and (4) normality of the distribution of variables; to be examined and suitable transformation to be performed to ensure that these assumptions are not violated. Suitable tests are conducted in this study and actions taken to ensure the validity of assumptions.

The two sets of hypotheses in this research require slightly different set of techniques for the analysis. The differences between the techniques and the conceptual differences between the two groups of hypotheses that require different techniques are presented below. The specific tests utilized for each class of hypotheses are also discussed below.

1.3.1 Direct Effects

Examining the direct effects of (1) different constructs of enterprise applications on performance (public value) constructs; (2) different constructs of resource capability on performance (public value) constructs; and (3) different constructs of enterprise applications on resource capability constructs, are done utilizing standard linear multiple regression techniques. In this study, first,
The effect of enterprise applications and resource capability respectively are analyzed on the service, productivity, and political consideration & financial productivity constructs of performance. Second, the effect of enterprise applications on tangible and intangible resources constructs is analyzed. It was concluded that these constructs are associated when statistically and practically significant results were found.

4.5.2 Mediation Effects

A mediating variable modifies the relationship between another independent variable and the dependent variable of interest (Baron and Kenny, 1986; Cohen and Cohen, 1983). Meditational models are concerned with explaining the mechanism by which another independent variable exerts its influence on a dependent variable. Figure 4.2 depicts a mediating relationship.

Figure 4.2: Graphical depiction of Mediation Relationship

There is a known relationship between Independent (IV) and Dependent (DV) variable. However, the relationship is significantly diminished when Mediating variable (MV) is also considered as a predictor of Dependent variable (DV). Testing for mediation involves establishing four conditions (Howell, 2002):

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1. The IV is significantly related to the DV (path c)
2. The IV is significantly related to the MV (path a), and
3. The MV is significantly related to the DV (path b)
4. When controlling for the effects of the MV on the DV, the effect of the IV on the DV (path c) is no longer significant.

These conditions are tested by performing three separate regression analyses. Additionally, the fourth analysis is performed to calculate the extent of mediation and whether the mediation effect is statistically significant.

Analysis One

The DV is regressed on the IV (path c) using one-step regression to test condition 1.

Analysis Two

The MV is regressed on the IV (path a) using one-step regression to test condition 2.

Analysis Three

Condition 3 and 4 is tested by a hierarchical regression (two-step) analysis wherein DV is regressed on MV (path b) in the first step, and DV is regressed on the IV (path c) in the second step of the same hierarchical regression. The beta for path c at step two is now examined. If the hypothesized MV is indeed a mediator, then the significant relationship between the IV and the DV established in Analysis One should no longer be significant (full mediation). That is, when controlling for the effects of the MV on the DV (by entering it first into the hierarchical regression model), the effects of the IV are no longer significant. If the IV and the DV model in
The hierarchical regression is still significant but regression coefficients are diminished, partial mediation is indicated.

The above procedures provide tests for the conditions necessary to demonstrate mediation (partial or full). However, they neither indicate the size of the mediation effect, nor whether or not the mediation effect of the IV through the MV is significant (MacKinnon et al., 2007; MacKinnon, 2008). Hence, it is important to calculate the mediation effect and test this path for its significance as is indicated in Analysis Four.

**Analysis Four**

Ald and Kenny (1981) suggested computing the difference between two regression coefficients of the IV from Analysis One and Analysis Three respectively. An equivalent approach calculates the indirect effect by multiplying two regression coefficients, IV on MV from Analysis Two and MV on DV from Analysis Three (Sobel, 1982). This study uses the “Sobel product of coefficients” approach with unstandardized beta coefficients to calculate the mediation effect and subsequently the Sobel test is used to test whether the mediation effect of the IV on DV through the MV is significant.

In the context of the current study, the above analyses (one to four) are performed to test all the mediation hypotheses by doing these analyses each time for the following variables:

- Enterprise Applications as the IV, Tangible Resource Capability as the MV, and Service construct of Performance as the DV;
- Enterprise Applications as the IV, Tangible Resource Capability as the MV, and Productivity construct of Performance as the DV;
Enterprise Applications as the IV, Tangible Resource Capability as the MV, and Political Consideration and Financial Productivity construct of Performance as the DV;

Enterprise Applications as the IV, Intangible Resource Capability as the MV, and Service construct of Performance as the DV;

Enterprise Applications as the IV, Intangible Resource Capability as the MV, and Productivity construct of Performance as the DV; and

Enterprise Applications as the IV, Intangible Resource Capability as the MV, and Political Consideration and Financial Productivity construct of Performance as the DV.

The empirical regression models and the hypotheses results for this study as per the analysis design described in this section for the two sets of hypotheses, direct effects and mediation effects, are shown in Chapter 5.

4.5.3 Triangulation of Hypotheses relating to Productivity

In order to enrich the interpretation of the results, it was decided to carry out an analysis of productivity ratios of the surveyed organizations to triangulate the results of some of the productivity hypotheses. An early reference to triangulation was in relation to the idea of Unobtrusive Method proposed by Webb et al. (1966), who suggested, “Once a proposition has been confirmed by two or more independent measurement processes, the uncertainty of its interpretation is greatly reduced”. In this study, a methodological triangulation (Denzin, 1970) is used that refers to using an additional method for gathering data for triangulation purposes. Annual Reports for those organizations under survey that were available, was used to study the financial statements therein and compute the common productivity ratios – debtors’ turnover.
inventory turnover, fixed asset turnover, capital WIP turnover and employee productivity – for 2 years before and after the implementation of EA respectively. The mean value of these ratios were subjected to paired sample T-Test to check if the changes were significant and whether they provided further support to the results of the hypotheses pertaining to productivity construct of performance.

In summary, this chapter has described the design & methodology related to the various phases of this research. The corresponding empirical data, analysis and results are shown comprehensively in the next chapter.